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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,283	08/01/2003	Juan Antonio Sabate	130681	5080

41838 7590 09/10/2004

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EXAMINER	
FETZNER, TIFFANY A	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 09/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/632,283	SABATE ET AL.	
	Examiner	Art Unit	
	Tiffany A Fetzner	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 August 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08/01/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on August 8th 2003 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is has been considered by the examiner, and is attached to this office action.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:

A) In **Figure 4** reference numbers **Vl**, **Vin** and **Iout** are not taught in the original disclosure with respect to figure 4. The examiner suggests applicant insert the Iout identifier in line 3 of paragraph [0027] on page 8 after the words 'gradient coil 120 receives a current'. The examiner is not sure where applicant should insert the reference to identifier Vin but a citation to this identifier is needed between paragraph [0026] on page 7 and the start of paragraph [0028] on page 8 of the original description.

B) In **Figure 5** reference numbers **Vin** and **Iout** are not taught in the original disclosure with respect to **figure 5**. The examiner is not sure where applicant should insert the reference to identifier **Vin, Vl,** or **Iout** in paragraph [0028] of page 8 but a citation to these identifiers is needed in paragraph [0028] on page 8 of the original description. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

A) On page 11 paragraph [0037] of the original specification applicant refers to figures 8A and 8b. the examiner notes that applicant only shows a figure 8**, there is no subfigure 8a or subfigure 8b within applicant's figure 8**.

B) In figure 11 the micro Faraday identifier is misprinted as **uF** instead of **μF correction is needed.** Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities:

A) On page 7, paragraph [0025] line 4 **delete** "figure 20" and **insert** "figure 2". There is no figure 20 in applicant's application.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claims 1-6, 9-13,** and **16-20** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Takano et al.,** US patent 5,721,490 issued February 24th 1998.

7. With respect to **Claim 1**, **Takano et al.,** teaches and shows "A method of operating a system having a coil, said method comprising: providing a switched amplified current to the coil; and adding a second current to the switched amplified current, wherein the second current is substantially out of phase with the switched amplified current such that the coil receives current with substantially no switching frequency ripple" " [See figures 10, 11a, 12; col. 12 line 37 through col. 15 line 34; col. 4 lines 21-40;col. 5 lines 15-21; col. 5 line 50 through col. 6 line 8; col. 6 lines 35-43 where the use of more than one current switching devices, which provide switched currents to the gradient magnetic field coil 116, where the switched currents are out of phase with / deviate from one another are taught and shown].

8. With respect to **Claim 9**, **Takano et al.,** teaches and shows "A gradient coil system" [See figure 12 and col. 15 lines 1-34] "comprising: at least one gradient coil comprising a first end and a second end;" [See figure 12 where the gradient magnetic field coil is shown to have a first end and a second end.] "a first inductor connected to said first end and providing a switched amplified current to said gradient coil; and a second inductor connected to said first end and providing a second current to said gradient coil, the second current substantially out of phase with the switched amplified current such that said gradient coil receives current with substantially no switching frequency ripple." [See figures 10, 11a, 11b, 12; col. 12 line 37 through col. 15 line 34; col. 4 lines 21-40;col. 5 lines 15-21; col. 5 line 50 through col. 6 line 8; col. 6 lines 35-43 where the use of more than one current switching devices, which provide switched currents to the gradient magnetic field coil 116, where the switched currents are out of phase with / deviate from one another are taught and shown. Additionally see figures 5, 6, 7, and 8].

9. With respect to **Claim 16**, **Takano et al.,** teaches and shows "A magnetic resonance imaging (MR1) system comprising: a main magnet configured to generate a substantially uniform magnetic field;" [See figure 12 component 115] "a radio frequency pulse generator configured to excite the magnetic field;" [See figure 12 components 112, 118, 115, and 114] "a gradient coil configured to generate gradients extending in different directions in the magnetic field" [See figure 12 component 116]; "said gradient

coil comprising a first end and a second end; a first inductor connected to said first end and providing a switched amplified current to said gradient coil; and a second inductor connected t: said first end and providing a second current to said gradient coil, the second current substantially out of phase with the switched amplified current such that said gradient coil receives current with substantially no switching frequency ripple." [See figures 10, 11a, 11b, 12; col. 12 line 37 through col. 15 line 34; col. 4 lines 21-40;col. 5 lines 15-21; col. 5 line 50 through col. 6 line 8; col. 6 lines 35-43 where the use of more than one current switching devices, which provide switched currents to the gradient magnetic field coil 116, where the switched currents are out of phase with / deviate from one another are taught and shown. Additionally see figures 5, 6, 7, and 8].

10. With respect to **Claim 2, Takano et al.,** teaches and shows "connecting a first inductor to the coil such that the switched amplified current is received from the first inductor; and connecting a second inductor to the coil such that the second current is received from the second inductor." [See figure 10. See also figures 11a, 11b, 12, 6; col. 12 line 37 through col. 15 line 34.] The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

11. With respect to **Claim 3, Takano et al.,** teaches and shows "coupling the first inductor with the second inductor via a transformer" [See figures 11a, 6; col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 3** and need not be reiterated.

12. With respect to **Claim 4, Takano et al.,** teaches and shows "coupling the first inductor with the second inductor via a transformer wherein the second inductor is connected to a first end of a secondary side of the transformer and a first side of a capacitor is connected to a second end of the secondary side". [See figures 11a, 6; with capacitor components 68, 67, inductor components 65, 66; and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2, 3** also apply to **claim 4** and need not be reiterated.

13. With respect to **Claim 5, Takano et al.,** teaches and shows "connecting a second side of the capacitor to an end of the coil opposite the first inductor and second

inductor". [See figures 11a, 6; with capacitor components 68, 67, inductor components 65, 66; and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2, 3, 4** also apply to **claim 5** and need not be reiterated.

14. With respect to **Claim 6**, **Takano et al.,** teaches and shows "connecting a second capacitor between the first inductor and second inductor and the end of the coil opposite the first inductor and second inductor." [See figures 11a, 6 with capacitor components 68, 67, inductor components 65, 66; and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2, 3, 4, 5** also apply to **claim 6** and need not be reiterated.

15. With respect to **Claim 10**, and **corresponding claim 17** which depend respectively from independent **claims 9,** and **16**, **Takano et al.,** teaches and shows "a transformer coupling the first inductor with the second inductor." [See figures 11a, 6 with transformer components 61, 62, 63, and 64 inductor components 65, 66; and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2, 3, 9, 16** also apply to **claims 10, 17** and need not be reiterated.

16. With respect to **Claim 11**, and **corresponding claim 18** which depend respectively from independent **claims 9,** and **16**, **Takano et al.,** teaches and shows that "the second inductor is connected to a first end of a secondary side of the transformer, said system further comprising a capacitor wherein a first side of said capacitor is connected to a second end of the secondary side of the transformer. [See figures 11a, 6 with transformer components 61, 62, 63, and 64; capacitor components 67, 68; inductor components 65, 66; Figure 10 and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2, 3, 9, 10, 16, 17** also apply to **claims 11, 18** and need not be reiterated.

17. With respect to **Claim 12**, and **corresponding claim 19** which depend respectively from independent **claims 9,** and **16**, **Takano et al.,** teaches and shows that "a second side of the capacitor is connected to said second end of said gradient coil."

[See figure 12, gradient coil component 116, figures 11a, and 6 with transformer components 61, 62, 63, and 64; capacitor components 67, 68; inductor components 65, 66; Figure 10 and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2, 3, 9, 10, 11, 16, 17, 18,** also apply to **claims 12, 19** and need not be reiterated.

18. With respect to **Claim 13**, and **corresponding claim 20** which depend respectively from independent **claims 9,** and **16**, **Takano et al.**, teaches and shows "a second capacitor connected between said first end of said gradient coil and said second end of said gradient coil." [See figure 12, gradient coil component 116, figures 11a, and 6 with transformer components 61, 62, 63, and 64; capacitor components 67, 68; inductor components 65, 66; Figure 10 and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, that apply to **claims 1, 2, 3, 9, 10, 11, 12, 16, 17, 18, 19,** also apply to **claims 13, 20** and need not be reiterated.

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

21. **Claims 7, 8, 14, 15, 21** and **22** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Takano et al.,** US patent 5,721,490 issued February 24th 1998.

22. With respect to **Claim 7** and **corresponding claims 14** and **21** which depend respectively from independent **claims 1, 9,** and **16**, **Takano et al.**, lacks directly teaching "a method (i.e. **claim 7**) / gradient coil system (i.e. **claim 14**) / MRI system (i.e. **claim 21**) comprising the limitations of, "connecting a first inductor to the gradient coil such that the switched amplified current is received from the first inductor, wherein the first inductor has an inductance **Lp**; and connecting a second inductor to the coil such that the second current is received from the second inductor, wherein the second inductor has an inductance **Laux**, wherein **Laux / Lp =(n-1)/n^2** where n is a number of primary turns of the transformer divided by a number of secondary turns of the transformer." However, the inductors 65 and 66 of figures 11a and figure 6, from the **Takano et al.**, reference meet the connection requirements of **claims 7, 14** and **21**, therefore components 65 and 66 have an intrinsic inductance Lp and Laux [See figures 11a, 6, and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65].

23. The examiner notes that the **Takano et al.**, reference is silent in words about the number of turns of the transformer, however because the configuration shows a transformer schematic with three deviations in direction (i.e. three turns) the examiner's position is that the transformer component shown in figures 6 and 11a of the **Takano et al.**, reference directly suggests that n=3. Therefore the equation of applicant's claim by substitution becomes **Laux / Lp = (3-1)/4 = ½.** Additionally, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Takano et al.**, to include the applicant's inductance equation because the output current **IL** of figure 11b in the **Takano et al.**, reference is suggestive of the result that **Laux / Lp = ½**. [See figures 11b, 11a, 6, and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65]. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 2, 3, 9, 10, 16,** and **17** also apply to **claims 7, 14,** and **21** and need not be reiterated.

24. With respect to **Claim 8** and **corresponding claims 15** and **22** which depend respectively from independent **claims 1, 9,** and **16**, **Takano et al.**, lacks directly teaching "a method (i.e. **claim 8**) / gradient coil system (i.e. **claim 15**) / MRI system (i.e. **claim 22**) comprising the limitations of, "connecting a first inductor to the coil such that the switched amplified current is received from the first inductor, wherein the first inductor has an inductance **Lp**; and connecting a second inductor to the coil such that the second current is received from the second inductor, wherein the second inductor has an inductance **Laux**, and wherein $(\omega^2 \cdot Caux \cdot Laux - 1) / (\omega^2 \cdot Caux \cdot Laux) = (n-1) / n^2$, where **n** is a number of primary turns of the transformer divided by a number of secondary turns of the transformer, **Caux** is a capacitance of said capacitor connected to the second end of the secondary side, and ω is an angular frequency." However, the inductors 65 and 66 of figures 11a and figure 6, from the **Takano et al.**, reference meet the connection requirements of **claims 8, 15** and **22**. Additionally figures 6 and 11a show capacitors 68 and 67 which meet applicant's requirements therefore components 65 and 66 have an intrinsic inductance Lp and Laux which satisfy the requirements of **claims 8, 15** and **22.** [See figures 11a, 6, and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65].

25. The examiner notes that the **Takano et al.**, reference is silent in words about the number of turns of the transformer, however because the configuration shows a transformer schematic with three deviations in direction (i.e. three turns) the examiner's position is that the transformer component shown in figures 6 and 11a of the **Takano et al.**, reference directly suggests that n=3. Therefore the equation of applicant's claim by substitution becomes $(\omega^2 \cdot Caux \cdot Laux - 1) / (\omega^2 \cdot Caux \cdot Laux) = (3-1) / 2^2$, or $(\omega^2 \cdot Caux \cdot Laux - 1) / (\omega^2 \cdot Caux \cdot Laux) = ½$. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Takano et al.**, to include the applicant's inductance capacitance equation because the output current **IL** of figure 11b in the **Takano et al.**, reference is suggestive of the result wherein $(\omega^2 \cdot Caux \cdot Laux - 1) / (\omega^2 \cdot Caux \cdot Laux) = ½$. [See figures 11b, 11a, 6, and the teachings of col. 12 line 37 through col. 15 line 34; col. 8 line 61 through col. 9 line 65].

The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 16, 17, 18, 19,** and **20** also apply to **claims 8, 15,** and **22** and need not be reiterated.

Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(703) 872-9306**.

Tiffany A. Fetzner

TAF
September 8, 2004

Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800